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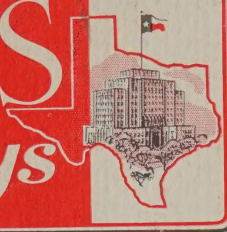
TEXAS Highways



August 1974

DO YOU KNOW TEXAS?

Celebrated in song and story, the San Antonio River remains one of Texas' most romantic and charming attractions. Much of the history of the state took place on its banks, and its beauty has been legendary for hundreds of years.

In the Sixteenth and Seventeenth Centuries this river was crossed by Alvar Nunez, Cabeza de Vaca, and Alonso de Leon and their expeditions. Discovering an Indian village in 1691 called Yanaguana, the Spanish missionary, Father Massanet, renamed the little town San Antonio de Padua. Later several missions were built along the stream.

During the war with Mexico many battles of the Revolution were fought near San Antonio and farther down the river. It was the scene of the Goliad Massacre, the Grass Fight, the Battle of Concepcion, and of course, the most famous of all, the Battle of the Alamo.

Although once used as a source for drinking water, irrigation, and power, the stream is best known today for its beauty. Forty-two bridges in San Antonio span the placid river as it travels across six miles of city blocks.

The Work Projects Administration began a beautification project in 1939 which included landscaping, deepening the stream, the creation of an outdoor theater, and other improvements. Since its restoration, the old Spanish town, La Villita, has become one of the show places of the area.

About the Cover . . .

The elements of nature have destroyed one of the most beautiful and often photographed landmarks on the Texas Highway System. All that remains of the graceful bridge on U. S. 90 spanning the Pecos River and its picturesque canyon is this ruined skeleton following the disasterous floods of June 27-29. This was the most costly single loss to the Highway Department in the flood. It will take many months and $1.7 million to replace the bridge. A temporary low water crossing is under construction at this site which presents quite an engineering challenge in itself because of the steep walls of the canyon. On Pages 3-12 we present a series of pictures of the havoc caused by flood waters. Texas Highways wishes to express appreciation and gratefully acknowledge receipt of these photographs from M. B. Hodges, District Engineer at Del Rio, Bill Fitzpatrick, Supervisor of the Laredo Highway Travel Information Bureau, and Roy Perkins, of U. S. 90 Association.

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TEXAS Highways

The purpose of this publication, "Texas Highways," is to furnish a medium for presenting practical ideas and information. Employees are invited and urged to submit suggestions and relate experiences which would benefit or be of interest to Highway employees. These conclusions and data are not necessarily endorsed by the Highway Department nor are they to be construed as instructions.

Photographic services are available and other assistance may be obtained, if desired, in preparing material for submission. All material and comments should be directed to the Information and Statistics Division, Austin 14, Texas.

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COMPILED AND EDITED
Information and Statistics Division

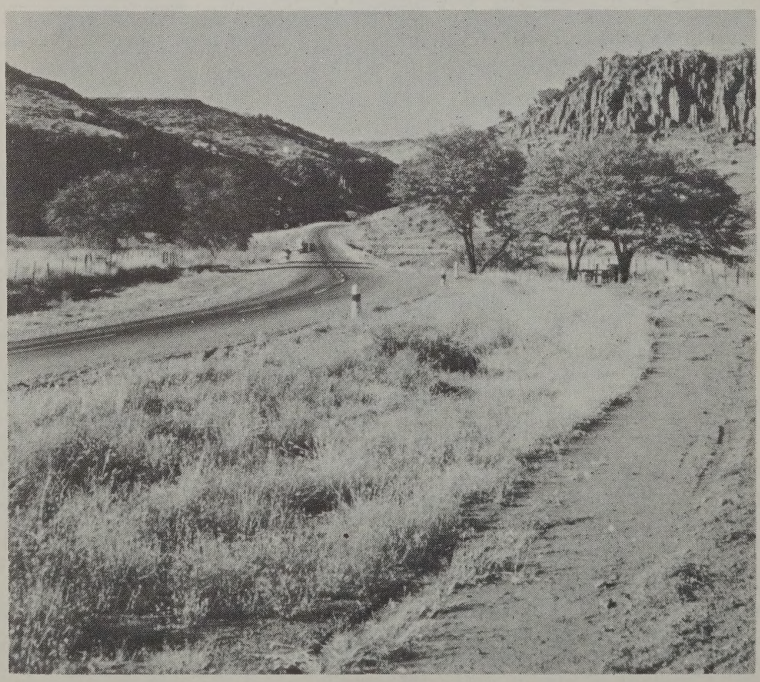
Grass Fires

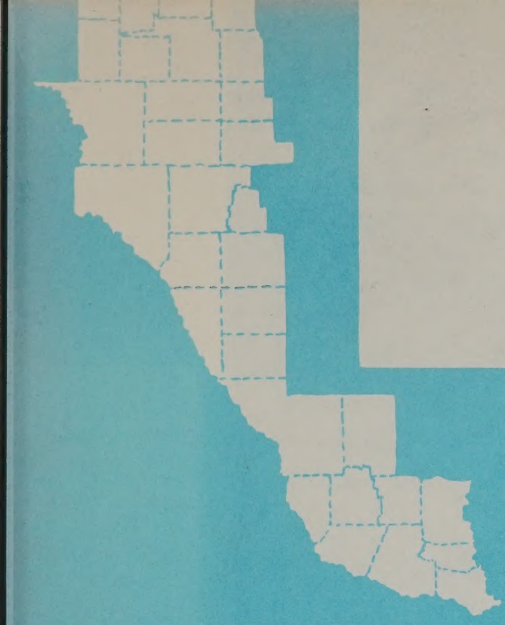
Some sections of Texas are experiencing the worst drouth in the history of the state. Grass along the right of way and in pasture lands has been burned to a crisp by the searing heat. This explosive situation can easily be set off by a careless motorist with a cigarette or match.

The Department is conducting its annual summer campaign designed to acquaint the public with this dangerous situation and to ask assistance in keeping fires from being started along the highways. The present severe drouth has created a real danger of destruction of fences lining the highways which may cost $500 to $1,000 per mile to replace. In addition, fires at this time of year will destroy what little grass and wild flowers remain.

To combat this menace the Department has a general policy on grass fire prevention which provides for the blading of a fireguard on the right of way as near the fence line as possible. Fireguards may also be cut on adjacent property upon request of the owner, provided the lane is cleared of obstructions and suitable provisions are made for crossing fences. When these means are not feasible or practical, the Department also does controlled burning of highway right of way. This is done only when the wind is in a direction which will blow the smoke away from the highway, and careful consideration is given to protection of wild flowers and erosion control vegetation. Raking of rank grass cuttings and frequent mowing is also practiced to minimize the fire hazard.

Uncontrolled roadside fires along the highway not only destroy the beauty of our roadsides, they also destroy valuable signs, bridges, and other highway property and often spread into adjoining woodlands and pastures.



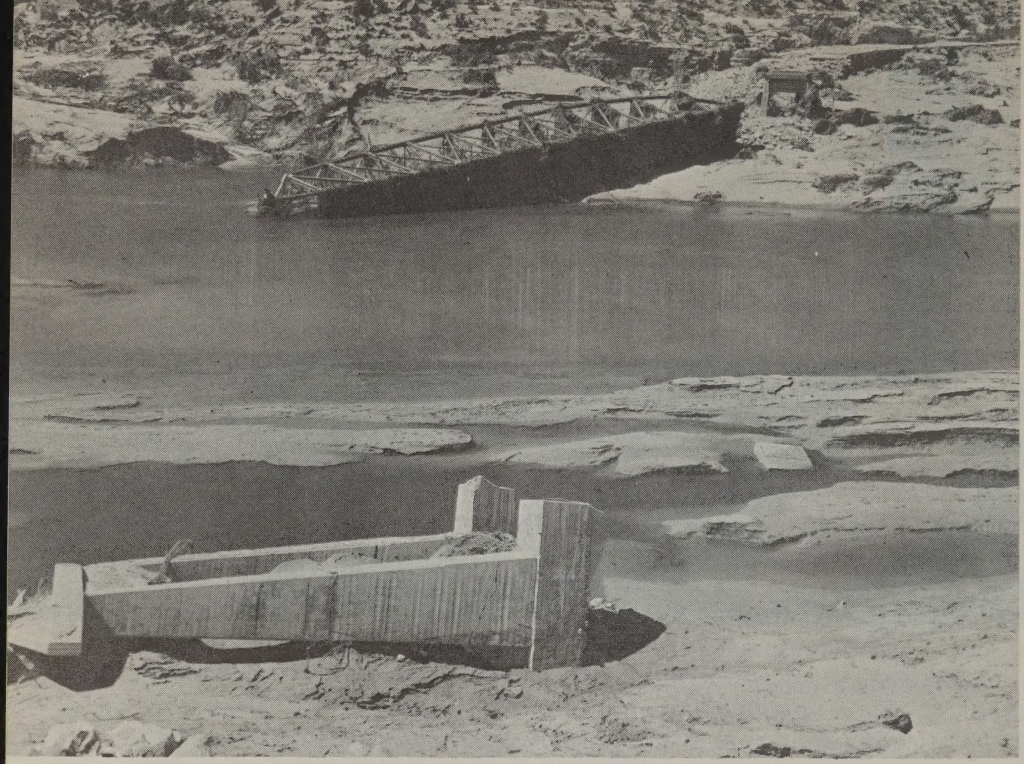


West Texas Floods

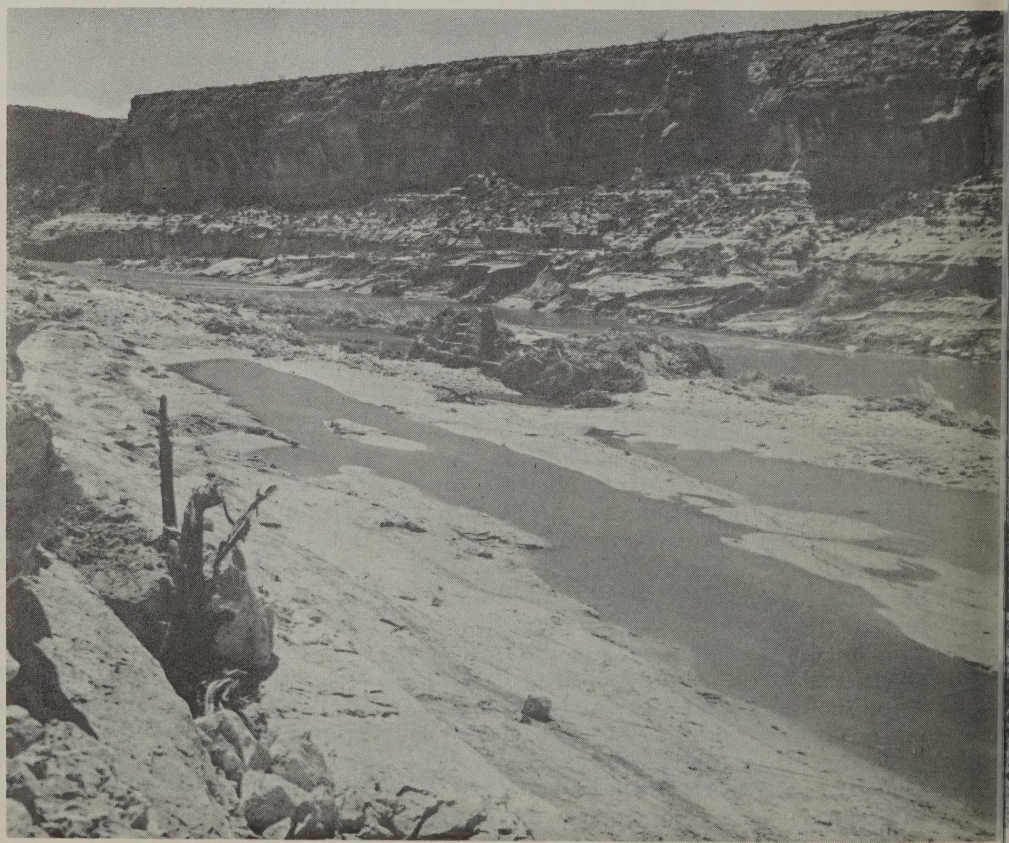
To anyone who has not stood and watched the chaos, the flash floods that sometimes hit arid western Texas are incredible. It is unbelievable that what was a boulder-strewn dry river bed one day can be filled the next with 60 feet of roaring dirty water. And still harder to believe is the fact that by the third day the river bed is dry and rocky once again, with only debris hanging in treetops and ruined roads left to mark the flood's passage.

The disasterous floods that struck Districts 7, 21, and 22 during the last week in June caused great loss of life, uncounted property damage, and will cost the state many thousands of dollars to rebuild and repair washed-out highways and replace destroyed bridges. It has been estimated that the replacement of the Pecos River bridge alone will run over $1.7 million.

The accompanying photographs will best illustrate the job confronting the Highway Department crews who are already hard at work restoring the damaged sections of roadway. A temporary low-water crossing of the Pecos has been authorized by the Highway Commission, and a new bridge is planned for the near future. M.B. Hodges, District Engineer at Del Rio, reported that all crossings on the Devil's River on State 163 were destroyed in various degrees and the estimate of essential repairs is set at from $150,000 to $200, 000 on this one highway.

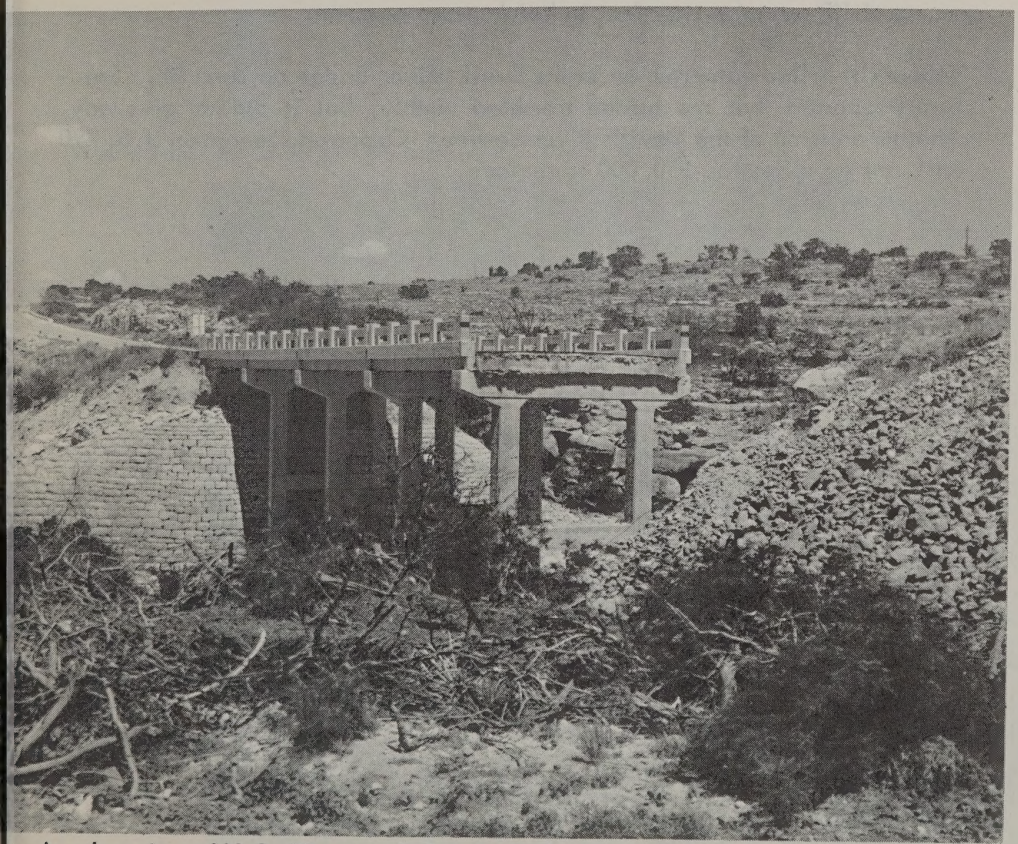


All that is left of the U.S. 90 bridge across the Pecos lies stranded by the receding flood waters. Loaded with debris, the superstructure looks more like a beached whale than part of a bridge.

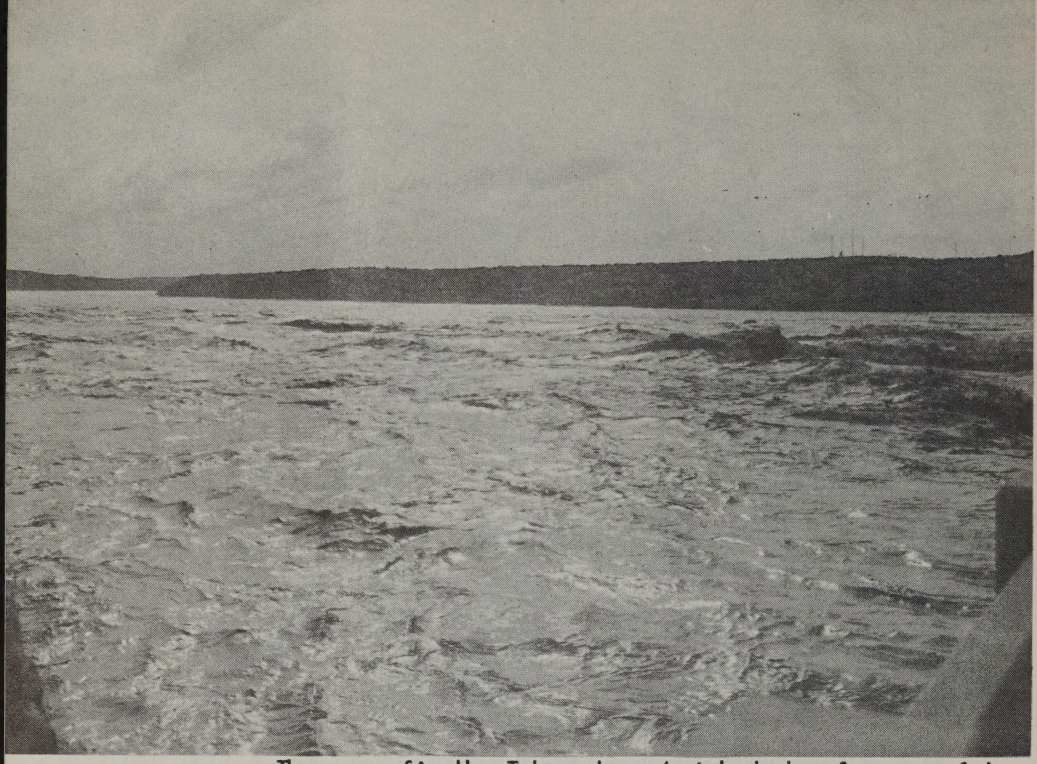


Remains of another section of the Pecos River Bridge rest on the nearly dry river bed after passage of the flood waters. Cost of replacing this bridge has been set a $1,745,000.

U. S. 90 between Comstock and the Pecos River was washed out by water, not blown up by a direct hit from a bomb.

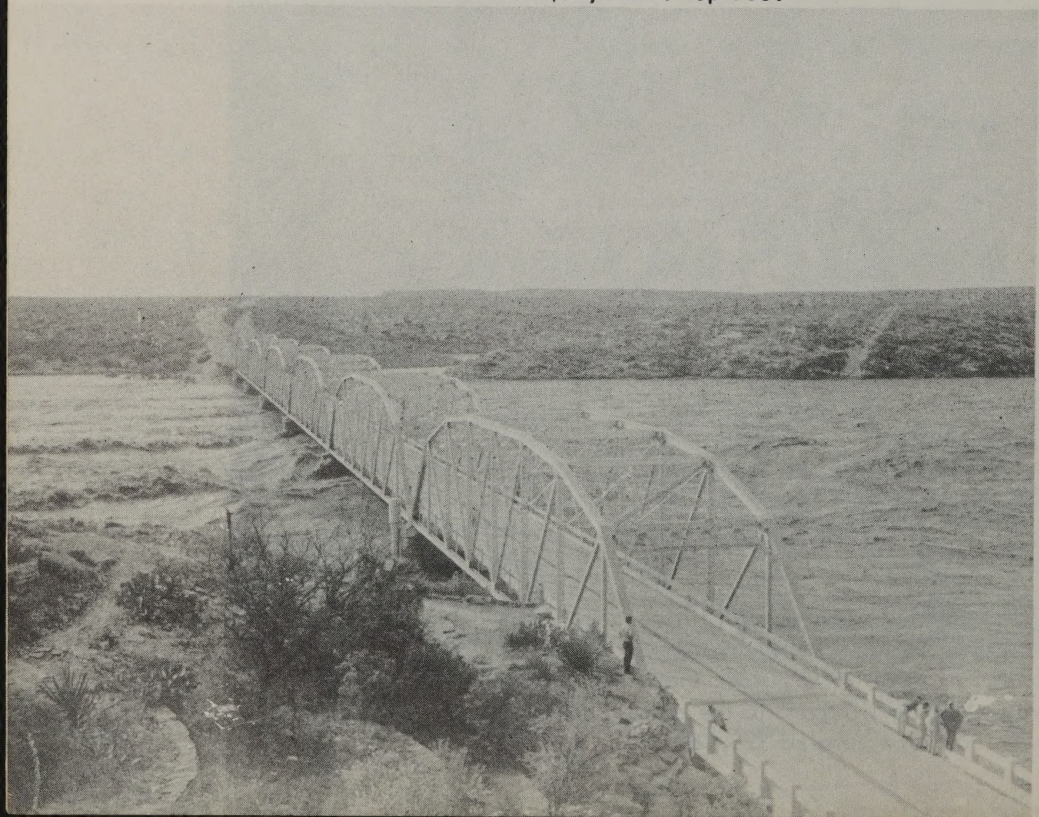


Another view of U. S. 90 west of Comstock shows the loss of another bridge at Seminole Canyon. Adding two spans to the present bridge because of washed out approach will cost an estimated $25,000.



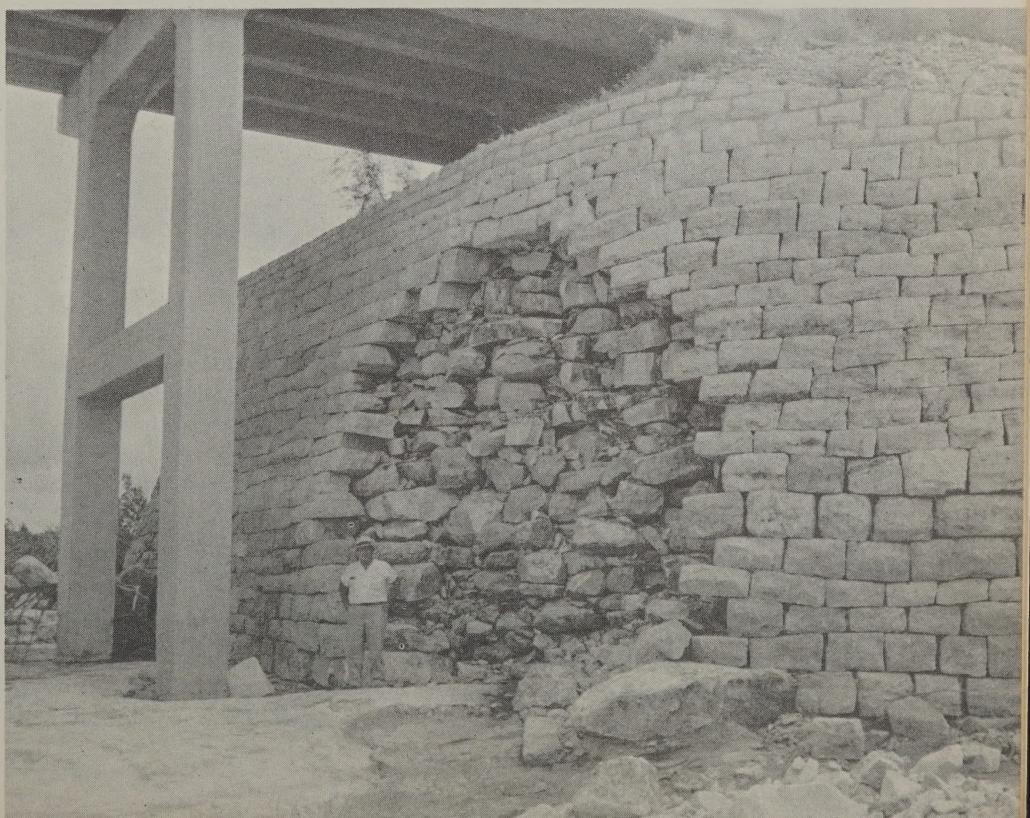
The cause of it all. Taken about 4 o'clock the afternoon of June 28, looking downstream from the east end of the Devil's River Bridge, also on U.S. 90. Department personnel in the Del Rio District reported that just below the bridge waves of fifteen to twenty feet in height were common.

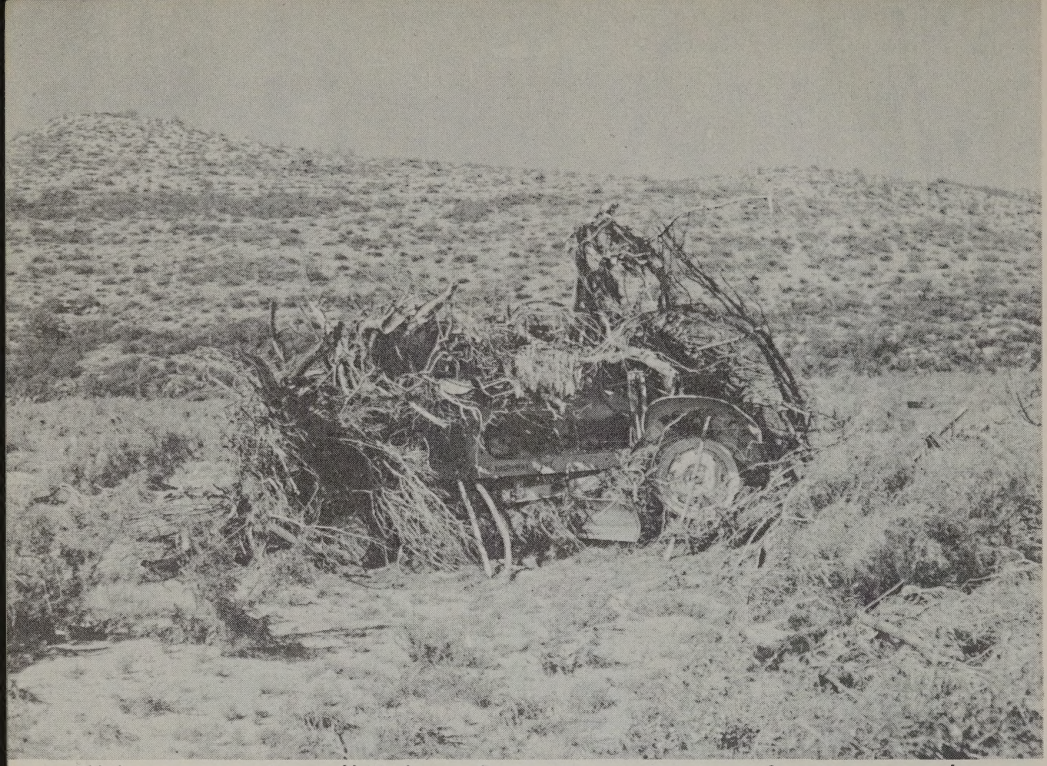
Tons of silt-filled water roar under the Devil's River Bridge on June 28. Spectators reported that the bridge trembled visibly, but it did not give way. Another crossing of the Devil's River between Ozona and Sonora on U.S. 290 will cost an estimated $50,000 to replace.



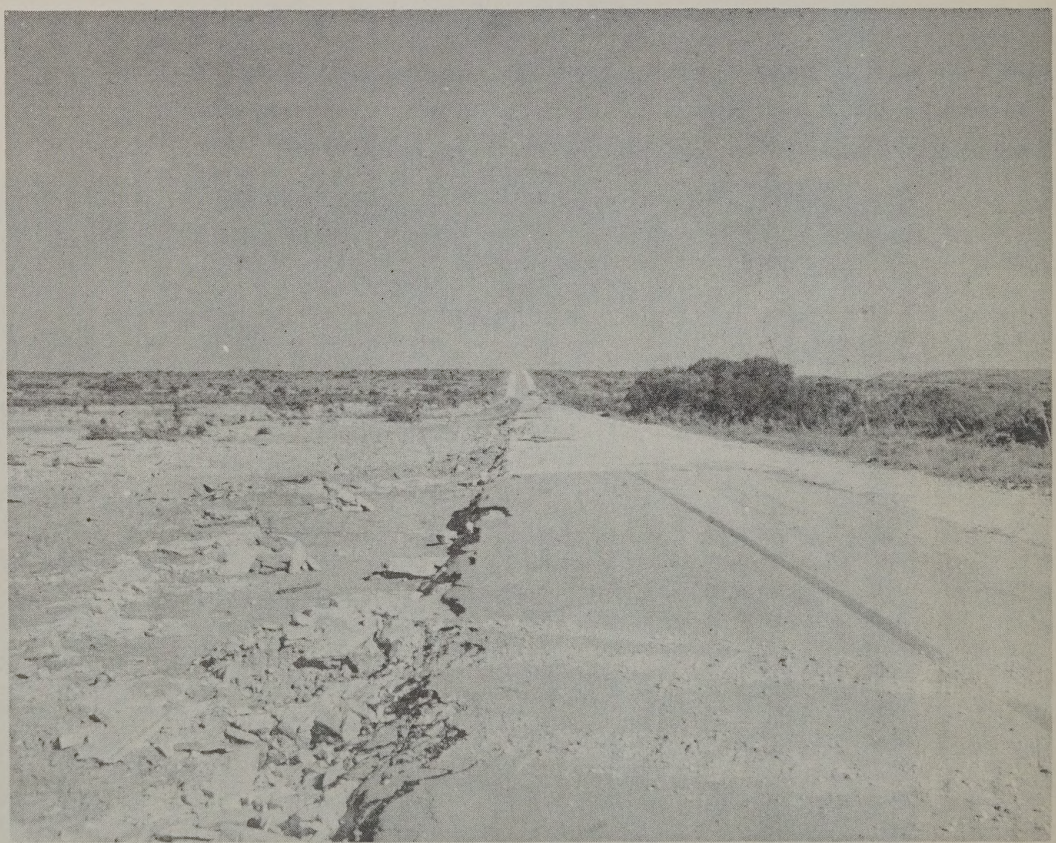
The Seminole Canyon Bridge, four miles east of the Pecos River ends abruptly in mid-air after passage of the flood.

Washed-out embankment at Seminole Canyon Bridge on U.S. 90.





All that remains of a small Highway Department maintainer after it was caught in the raging waters. It was saved from complete loss by being caught on a section of fence. This occurred on S. H. 163.



Roadway damage at Cow Creek on U.S. 90 three miles west of Comstock.

Loss of a section of roadway at a small canyon about four miles east of the Pecos River on U.S. 90. This was caused primarily by the loss of a dam at a stock tank a mile north, with the result that all of the stored water descended on the roadway in one huge wall. Note small boy playing unconcernedly at edge of roadway at right.

One way to use a highway. Army helicopters were used at the height of the flood to remove stranded train passengers from Langtry to Del Rio. This picture was taken on U.S. 90 about one mile east of the Devil's River.

There's a highway here — if you want to dive for it. U.S. 83, one mile south of Laredo, lies inundated by floodwaters from the Rio Grande.

The U.S. customs house in Laredo was not open for business on this day. Visible across what used to be the Rio Grande channel is the modernistic building of the Mexican customs at Nuevo Laredo.

U.S. 59 and 83 in the city limits of Laredo lie completely deserted under a sheet of water. The only moving thing visible is the debris.

Senor Gomez and Son won't be changing money for turistas for a while. Located about two blocks from the U.S. customs office, this row of shops will present quite a cleaning project when the water recedes.

A highway with no place to go. U.S. 59 and 83 and the Texas Mexican Railway are all cut off by flood waters in Laredo.

After the flood, this dramatic picture shows the force of the water. Parts of the International Bridge at Laredo lie scattered in the river channel like jackstraws littered with other flotsam left by the river.

Up at 7:15 a.m., January 12, 1954. Had a sleepless night over the case of Equipment Rental. No clues; nothing but a mass of figures without order or meaning.

Headquarters, D-4, had called off its experts last September; tossed the case to Joe Thursday at Lubbock; no instructions except to handle in his own way and solve the mystery. No leads; just a squirming revolution of vehicles into the repair shop; back to the job; back to the shop; mounting loss. Who was guilty of the unbalance? What vehicles? What persons? Was it the machine? The employee? The supervisor? Or the accounting records? No one could even guess. That's your job, Joe. Start looking for suspects.

I had spent four months in the office compiling figures; drawing new pencils from stock; heating up calculators; persuing law of logarithms, nth roots, and compound interest. No results. The unknown snowballed by compound interest, while the known accumulated no faster than an amateur puts trout into his creel.

The more I figured, the less I knew; the more ground I lost. I gave up the pencil angle; it would take leg work; had to find a new approach.

It was 8 a.m., January 13, when I wheeled into district headquarters grounds. No parking space as usual. At 8:15 I parked outside on the highway street. I walked back to the shop; stood in the main door looking over equipment under repair. The workshop was full.

I had an idea that brought the sweat. I had been dealing in the past. Why not try the present linked with the future? Catch the criminal before he committed the crime? Can't understand present-day life by digging up bones of Stone-Age men.

The shop foreman came up. "What you doing over here, Joe?" he asked.

"Facts, just facts, Tex," I replied.

"It's this equipment rental mystery."

"Oh," he said, and started toward the rear.

"Just a minute, Tex, I want to ask you some questions. Just tell me the facts. Do you know anything about this?"

"Very little," Tex replied.

"Are you sure? It's no use to cover up; the facts will come out."

"What's ailing you, Joe? You look worn out."

"Never mind, Tex; I'll rest later. When equipment is brought in do you first make an estimate of the cost? You do? Do you write it down anywhere? Could you write it down on the work order? That's fine."

"Now as to the facts. Do you hit fairly close to the final cost?"

"Offhand, I don't know, Joe."

"Well, are you short $100 or over $100? Think! This is important."

"I know one thing," Tex said. "I never underestimate the cost."

"How do you know? You said a moment ago you didn't remember."

"Look here, Joe. I miss 'em all right, but never short. I used to own and operate a motor repair shop uptown. When I made an estimate it was always high enough. It's chumps that underestimate."

"How long were you in business, Tex? Did you make any money?"

"Sure I did; plenty, by estimating high."

"That's important, Tex. Your estimates are high. I need that kind of facts. If I could use your estimates at the time they happen, I could bring in the future. This mystery hinges on the future. You give me the facts or figures from day to day. I will apply my new anticipation formula."

Just at that moment Equipment Number 1200-D, small motor grader, was dragged into the shop. "Give me your estimate on that job, and I'll try out my formula," I said.

Tex pulled out a short pencil, put down the number of the equipment, divided by six, number of wheels, multiplied by 2.4 years, age of the grader; then divided the result, $480, by three, usual number of months between repairs.

One hundred and sixty dollars was the amount estimated. I went back to the office. It was 9 a.m. Number 1200-D had started to lose; it lost $50 last month. All the other facts were on the summary sheet. I had to figure a rate that would absorb the $160 estimate within the next three months, and the $50 normal loss per month for the preceding month and the next three months. That was $200 plus $160 coming up. The operating expense plus this $360 had to be provided for.

I made proper substitutions in the Dregnet Formula. The old rate was $1.64. The new rate turned out to be $3.17. It was then only 9:25 a.m. Legged it over to Lou's cafe; enjoyed the coffee for the first time since taking over the case last September.

Returned to the office. It was 9:40 a.m. Looked through the book (Austin mail). D-11 had given up; no further aches about travel expense statements. D-3 couldn't understand how we determined that 90 miles was a short haul on a 90-foot derrick, declaring that the same oil field was not that big. D-4 was playing the same old cracked record, stating that the Board of Control was still functioning as the legal purchasing agency and that no new law had been passed exempting District 5 from the regulations. Nothing in the Austin mail to worry about.

Don't miss the next Joe Thursday episode on Channel 190 or Channel 534 next October, when Sergeant Thursday solves the warehouse problem by using only one stock card and the same unit price for all items. The annual inventory for the district warehouse will consist of only one line, Miscellaneous Repair Parts and Supplies, with one quantity entry, one unit price, and one extension. Drink Bunko Coffee and you will want to live forever.

To protect the innocent, all names and places have been changed.

The Dregnet or Joe Thursday Formula

Rate for Anticipated Expense

Formula: $r + 1.15 \sqrt[N]{\frac{Ex}{T}} = R$ (desired new rate)

Code:

r = present rate $1.64.
R = new rate, to be calculated.
115% or 1.15 = total expense (direct plus indirect)
n = anticipated period of absorption (3 months) plus preceding month.
= 3 + 1 = 4

T = quantity worked preceding period, or average worked per period = 81.
Eq = rental income at present rate for preceding period, or the average rental income for one month at present rate, using averages.
Ex = expense for the period concerned. By averages, expenses for any desired length of time may be derived.
Always: Ex = Eq + Loss, or Ex = Eq - Gain

l = loss in dollars for preceding month = $50.

L = average loss per month during anticipated period, if rate is not changed, derived by adding l x n to the estimated cost on current work order, and then dividing by number represented by n.
In this case: $50 x 4 = $200; + $160 (work order) = $360.

Assume: Eq. 1200-D has present rate of $1.64; works average 81 hours per month (81 x 1.64 = $133 = Equipment Income); has accumulated loss of $50; and current work order for repair is estimated at $160.
It is desired to bring the equipment to a break-even point within the next three months.

L is calculated as follows:

W. O. Estimate	$160.
$50 normal loss for 4 mos.	200.
	$360.

Therefore L = $90. Divide by 4 = $90. avg. loss per month if rate is not changed.

To find Gross Expense:

Ex = (Eq + L) 1.15 Gross Expense
= ($133 + $90) 1.15
= 223 x 1.15
Gross Ex = $256.

Substitute in the Formula above:

$$1.64 + 1.15 \sqrt[4]{\frac{256}{81}} = R$$

$$1.64 + 1.15 \left(\frac{4}{3}\right) = R = \$3.17$$

Proof:

$3.17 x (81 x 4) = $1,027.08 Rental
$256 (exp.) x 4 mo. = $1,024.00 Gross Exp.
Difference is $ 3.08 gain at end of the next 3 mos.

White Aggregate Center Stripe

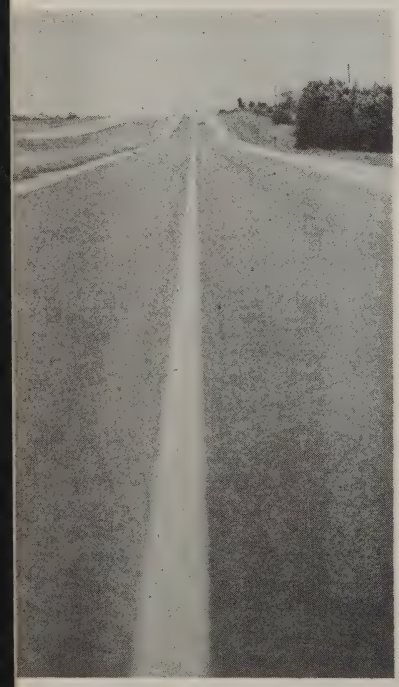
Alton Vordenbaum, Maintenance Superintendent
District 15

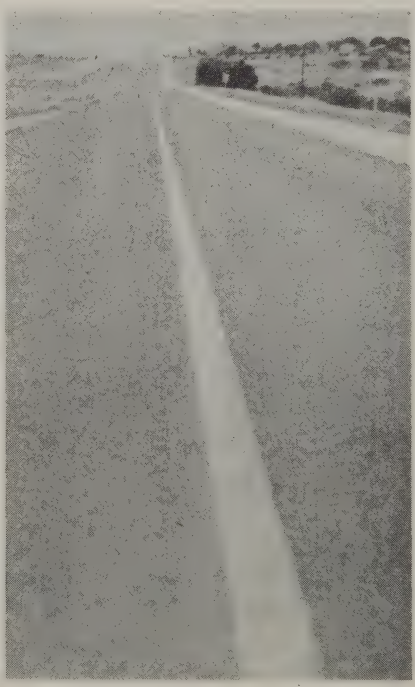
District 15 used white paint stripe for temporary center stripe or lane lines on black premix surfaces until about a year ago when it was decided to try a white aggregate stripe.

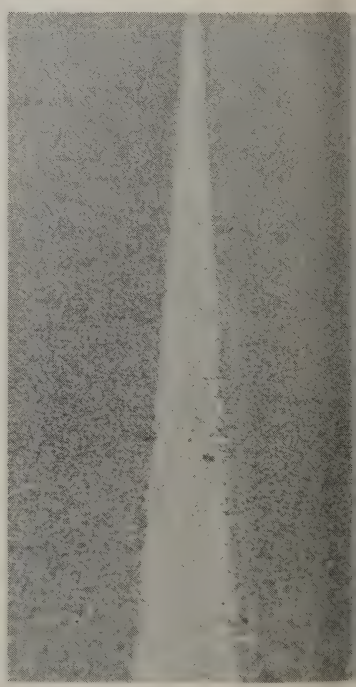
The aggregate stripe was placed as soon as the surface had been completed and the pilot line placed. Quantity of RC-2 Asphalt applied for the stripe depended on the density of the surface on which it was placed. The grade 9 white aggregate was applied heavily enough to provide complete coverage with some excess to prevent traffic turning over the stone on the fresh oil. The small stone provided a low stripe that we propose to cover with a black aggregate when the pavement bleaches into a grey color. Due to the fine white aggregate used initially, the black stripe will not be too high.

Cost of the white paint stripe was approximately $95 per mile, while the aggregate stripe cost about $60. The stone stripe served the purpose until the pavement bleached, but the paint stripe had to be replaced in some instances if there was heavy traffic and rainfall. The advantage of the temporary stone stripe over the paint stripe is the considerable saving that is effected.

The pictures show some completed temporary stripe on asphaltic concrete pavement on U. S. 81 between New Braunfels and Selma.







Disposal of Old Sabine River Bridge

Ken Nagai, Senior Resident Engineer
District 20

Dedication of the new Sabine River Bridge at Orange on May 11, 1954, marked another milestone in the Highway Department and the culmination of planning that began as far back as 1944. Due to the limited funds and other problems encountered in crossing a navigable stream, the construction begun in 1949 was not completed until January, 1952. The entire project, including approaches and culverts, took nearly five years.

This new bridge cost a total of $1,847,000, of which Texas contributed $932,000 and Louisiana $915,000. The Texas Highway Department designed, drew the plans, and furnished the preliminary engineering for this entire project. Approaches on the Texas side and new highway from the City of Orange to the bridge cost an additional $1,918,000. With two 26-foot roadways and a four-foot divider, the new bridge is 3,102 feet in length with a horizontal clearance of 150 feet and a vertical clearance of 50 feet.

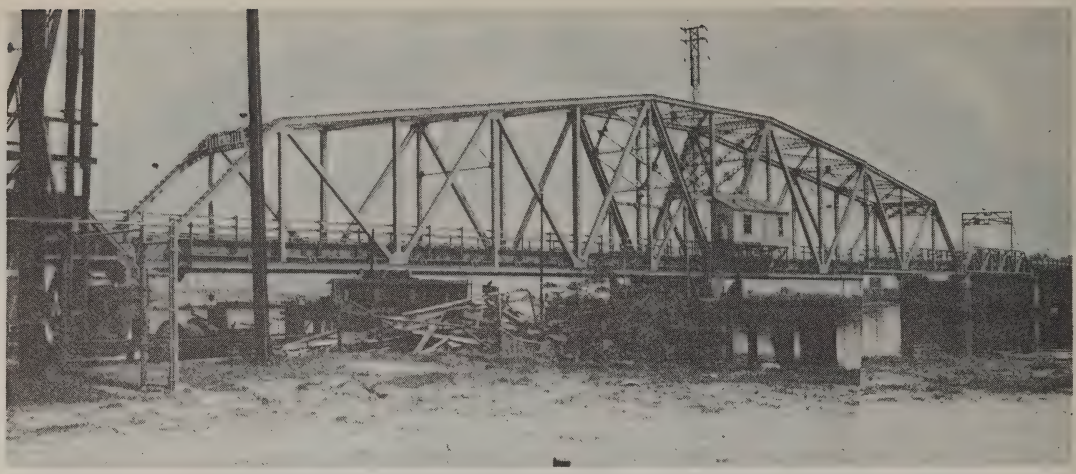
Several factors entered into the selection of the new site for crossing the Sabine. It provided the most practical alignment for the U.S. 90 crossing and was considered the most economical site for the construction of a bridge of the type erected. In addition, by crossing the river to the north of Orange, the new bridge will not prove a navigation bottleneck since it is above the naval anchorage.

But what of the old bridge, constructed in 1926, which served so many useful years? Hopelessly outdated by the tremendous increase in volume of traffic engendered by the industrial development in the Houston-Beaumont-Port Arthur-Orange area, it nevertheless continued to carry traffic between the two states for many years after it was declared inadequate.

The U.S. Army Corps of Engineers permit for approval of location and construction of the new bridge approximately one mile upstream from the existing bridge requires that the old structure be removed down to the natural river bottom not later than 120 days after the new bridge has been opened to traffic. Also, in the agreement between the states of Texas and Louisiana, it was agreed that as soon as practicable after opening the new bridge to highway traffic, the existing interstate bridge and fenders would be removed.

A Minute Order passed by the Highway Commission in January, 1954, authorized the removal of the Sabine River Bridge on old U.S. 90, on Green Avenue in Orange. In this district, obsolete bridges which are of such a size that they require special equipment and skill, are removed by contract.

In line with this policy, bids were taken in the April highway lettings at Austin and at Baton Rouge. The Delta Equipment and Construction Company, Inc., Baton Rouge, Louisiana, was low bidder on a bid of $77,000. Portions of the old structure which are deemed unsalvable by either the Texas Highway Department or the Louisiana Department of Highways will become the property of the contractor and can be disposed of in any manner that he elects.



Main span and Louisiana approach of the old Sabine River Bridge, looking northeast from the Navy Yard.

Main span of the Sabine River Bridge, looking downstream from the Navy Yard south.

Roadway view of the old Sabine River Bridge looking west from the Louisiana side.

New Sabine River Bridge on U.S. 90 at Orange.

On the other hand, any materials that are declared to be worth saving by the Department will be salvaged and used for spare replacement parts for other like structures located in this district. For example, some structural steel will be salvaged for use in fabrication and repair of other structures, detours, and for district shop use.

We have deemed salvable the following materials from this bridge: 1. Channel handrails, 2. Electrical control desk and limit switches, 3. All shafting, 4. All wedge bronze nuts, 5. All floor beams and stringer beams in the swing span, 6. All sirens and warning lights, 7. Two 75-foot approach trusses complete with floor beams, stringer beams, and lateral bracing, 8. Any salvable timber from the west timber trestle approach, 9. Steel H-piling and structural steel in the fender system.

All salvable material from the east timber trestle approach spans are to remain the property of the Louisiana Department of Highways to dispose of as they see fit.

While it is not always the practice of the Department to remove bypassed structures, the Minute passed by the Highway Commission in 1946 setting up the plans for the new bridge, mentions that the existing structure will be removed at the discretion of the Department. This Minute was accepted by both the City of Orange and the County of Orange at the time. Structures which are not to be removed and are no longer needed on the State Highway System revert to the county and become their jurisdiction.

We do not expect to encounter any unusual problems in removing this old bridge, with the possible exception of the stabilized cement sandbags and Class "E" concrete placed around the pilings of the east rest pier.

The Louisiana Department of Highways will share equally in the cost of the removal of the main structure and the entire cost of the removal of the east timber approach trestle. The States of Louisiana and Texas have a "continuing construction and maintenance agreement" which applies to the new structure. The agreement also states that each state shall pay one-half the cost of maintaining the new bridge and its appurtenances, and will share equally in the lengthening of the structure if the necessity should arise, as well as replacing any part or all that may be damaged by fire, floods, or other cause. This damage clause includes fenders and navigation lights, bank protection, jetties, or similar work required to protect the bridge or its approaches or to hold the river to its present course, regardless of whether such work shall be located wholly in one state or the other.

The Texas Highway Department is given the authority under the agreement to have all work done on the bridge, for which it will present the Louisiana Department of Highways itemized statements.

Reconstruction of 127

C. N. Parsons, Assistant District Engineer
District 22

In mid 1932 the State Highway Commission designated a state highway in Uvalde County extending from Sabinal in a northwest direction to a point .8 mile north of Concan, a distance of approximately 21 miles. A highway between these points afforded the people living in the Frio Canyon area, in the vicinity of Leakey, more direct access to railroad facilities at Sabinal and opened up a more direct route to the recreational area of the Frio Canyon for the people residing in the metropolitan area to the east.

A construction project was authorized for the entire distance and in 1934 construction was started, with the project being completed in 1935. The alignment selected for the greater part of the route followed the existing county road, which at that time had a surface of a light application of caliche and caliche gravel approximately two to three inches in depth. The construction project authorized at that time consisted essentially of adding sufficient caliche gravel to form a total depth of six-inch compacted base, twenty feet in width. A trench type of subgrade was utilized, material to form the trench being bladed in from the ditches. This material was later bladed out to form the shoulders and to produce a finished roadway crown width of 24 feet. Cold-mix limestone rock asphalt was then applied one-half inch in depth for a width of sixteen feet to form the riding surface.

The road served as a traffic facility very nicely, with only routine maintenance until about 1945 when both base and surface began to fail quite rapidly, probably due to heavier loads being hauled, an increase in traffic, and lack of normal maintenance during the war years.

The maintenance problem became increasingly difficult and it was finally decided to reconstruct the project extending from its intersection with F.M. 187 to its intersection with U. S. 83, a distance of 19.5 miles, provided authorization to do so could be obtained.

The project was included and approved on the 1953 Betterment Program at an estimated cost of $300,000. The proposed work included a revision of the typical section to eliminate the trench effect of the existing section by placing base the full crown width of subgrade, adding sufficient base material to obtain a twelve-inch depth of compacted base with a finished crown width of 30 feet for the base, and then widening the surfacing to 22 feet. In addition to that, we were proposing to widen the existing structure at the Sabinal River and to revise the existing grade line in several locations to improve vertical sight distance and to reduce the curvature by a revision of the alignment in several instances.

We first had intended that the existing bridge on the Sabinal River should be widened but we later revised our plans, removed the old structure, and

SABINAL RIVER BRIDGE

Before

After

MILEPOST 16

Before

After

0.1 MILE SOUTH OF MILEPOST 12

Before

After

0.1 MILE SOUTH OF INTERSECTION OF F.M. 1049

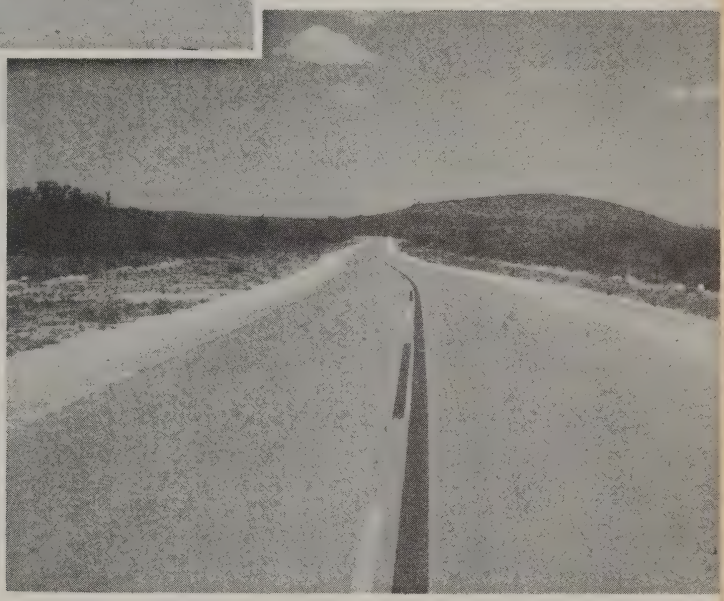
Before

After

0.5 MILE SOUTH OF MILEPOST 6

Before

After



replaced it with two 60-inch concrete pipes, concrete roadway slab with 26 feet width, and concrete riprap both upstream and downstream on the slopes.

Construction procedure followed involved preparation of the subgrade to obtain additional width. This was accomplished by blading out the material forming the existing shoulders to a depth dependent upon the existing base, then shaping and compacting the subgrade with sheepsfoot and pneumatic rollers. Then the existing base material was scarified, spread in a uniform layer for the full width of the subgrade and recompacted. The additional base material, pit-run, was then added in two courses. The material was compacted in light lifts, using sheepsfoot, pneumatic, and grid-type rollers. We tried using the grid roller for the first time in this District on this project, and found it most useful in road processing the material as well as for obtaining good compaction results. The second course of material was shaped, compacted, and finished to section and a smooth riding surface obtained preparatory to placing 60 pounds per square yard of cold-mix limestone rock asphalt pavement for a width of 22 feet.

It was necessary to alter our construction procedure in several instances where we had revised the grade line to improve sight distance or where the alignment was revised to reduce the degree of horizontal curvature.

The results obtained are quite gratifying, for we feel that we have an excellent piece of work constructed with the funds provided and that the traffic facility thus provided will fill the needs of present-day requirements and will care for the potential traffic increase for some years to come with only routine maintenance required.

Personnel Changes

H.L. Arno, Director of Personnel

District 4

County Residency, Amarillo, to Expressway, Amarillo: Byron Reese changed from Senior Resident Engineer to Expressway Engineer June 1, 1954.

District 7

County Residency, Sonora, to County Residency, San Angelo: C.C. Stroud, Senior Resident Engineer, transferred May 15, 1954.

District 14

County Residency, Austin: Don L. Hook, Senior Resident Engineer, accepted retirement June 30, 1954.

County Residency, Fredericksburg: J.D. Staples changed from Resident Engineer to Senior Resident Engineer June 1, 1954.

Urban Residency, Austin, to Expressway, Austin: R.H. Fincher changed from Supervising Urban Engineer to Expressway Engineer June 1, 1954

District 20

County Residency, Beaumont, to Expressway, Beaumont: E.R. Young changed from Supervising Urban Engineer to Expressway Engineer June 1, 1954.

District 25

County Residency, Childress: Clarence E. Gresham, Senior Resident Engineer, died April 29, 1954, from injuries received in an automobile accident.

Fort Worth Urban Project

G.M. Garrett, Engineer-Manager, retired June 30, 1954.

F.E. Lovett changed from Assistant Engineer-Manager to Expressway Engineer July 1, 1954.

Bridge Division, Austin

P.V. Pennybacker, Supervising Field Engineer, changed to Special Bridge Engineer of the Corpus Christi Ship Channel Project June 1, 1954.

Road Design Division, Austin

T.S. Huff changed from Assistant Engineer Road Design, to Engineer, Road Design, June 15, 1954.

To Texas Turnpike Authority, Austin: J.C. Dingwall, Engineer, Road Design, transferred as Engineer-Manager of the Texas Turnpike Authority June 15, 1954.

Techniques of Photography

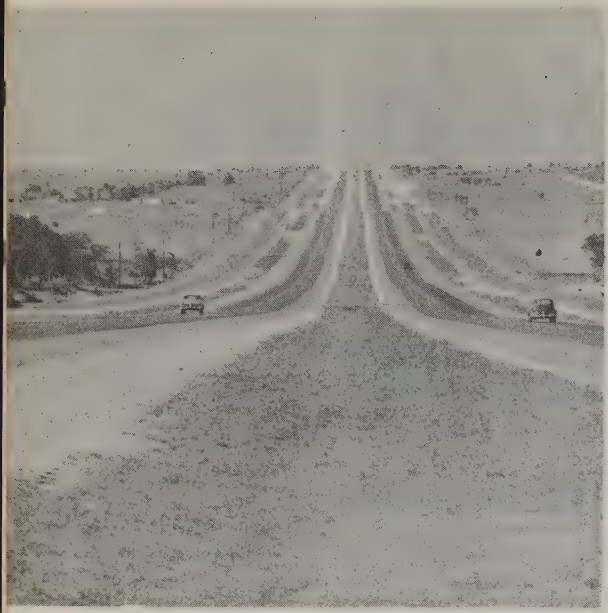
II. Mechanics

Every trade has its tools and equipment, whether it is ditch digging, seal coating, or photography. And common sense teaches us that the tools and equipment are no better than the operator. In this second article on photography, the actual tools or equipment will be discussed in terms which can be comprehended by the novice as well as the expert.

The equipment, which means the difference between a common snapshot and a real photograph, represents some of the finest precision instruments manufactured today, and when correctly used, will give astonishing results. In using any equipment, the operator should thoroughly understand its functions and care. Through proper understanding and use of the basic equipment necessary for photography, many errors can be eliminated and the pleasure of routine picturemaking can be greatly increased.

There are two basic factors which must be taken into consideration and compensated for, if possible, when making any kind of picture. These are LIGHT and DISTANCE from the subject. Most cameras have some or all of the adjustments necessary for regulating these factors. Considering light, the direction and type are most important. For all practical purposes, the direction of the light should be in the same general direction as the camera is pointed, and the beginner should never attempt to make pictures when the camera is pointed directly into the light. Caution should be taken so that the picture will not reveal long shadows cast by the photographer or the subject unless these unusual effects are desired in the photograph. Type of light should also be considered since haze, dust, and other elements of the weather often make judgment of the amount of light available difficult. Usually the eye can be easily fooled in the early morning and late afternoon about the amount of light since there is not as much light during the beginning and ending of the day as might appear to the eye.

In the case of distance, the eye and the camera never agree since the eye immediately focuses at any distance, and the camera must be manually focused. Some of the less expensive cameras do not have a focusing device but are calibrated for a fixed distance of possibly 10 to 25 feet. The most common mistake made by all photographers is getting too far away from



These scenes show the importance of using the proper f. stop to obtain depth of field. RIGHT: An f. stop of f/32 at 1/100th of a second was used. Note sharp details brought out in both foreground and background. WRONG: Here, an f. stop of f/4.5 at 1/400th of a second was used. Note how all details are fuzzy or lost in the background.

the subject with the camera. The subject appears close to the eye, but in the camera it will appear to be several times farther away. In portraits and close-up pictures of specific subjects, the entire negative should be filled with the subject matter to eliminate having to crop and make an enlargement. Observe a few of your own or your friends' snapshots and see how many of the pictures you feel would have been improved if the photographer had been closer to the subject.

Actually, there are four variables which must be considered and camera adjustments made in taking a photograph: (1) the intensity of light; (2) the speed of the film used; (3) the speed of the camera shutter; and (4) the size of the diaphragm, or f. stop, which determines the size of the opening in the shutter. All of these must be properly coordinated to achieve a properly exposed negative and give correct emphasis to the subject or bring out other details.

The speed of the film is given by the manufacturer with each roll or pack. Generally speaking, the faster the film speed, the larger the silver nitrate grain, and conversely, the slower the film, the smaller the grains. The size of the metallic silver grain in the developed negative is the determining factor in the quality of the finished print. The slow film with the smaller grains will give a sharper finished picture and will reflect more minute details. The faster film with larger grains will give a coarse negative, and the finished picture will be lacking in sharpness and fine details. It should be remembered that the slower the film, the more light required for proper exposure. A rule-of-thumb guide to follow is to use Super-XX fast film on flash pictures and on scenes where there is swift movement of any kind. Plus-X, or a slow film, should always be used on landscape and distant scenes, portraits, and other close-up work. The speed of the film used should also be determined by the amount of light. In selecting film, it should be kept in mind that the slower the film, the better the picture if sufficient light is available for the pictures.

The f. stop determines the size of the opening in the diaphragm of the shutter. The size of the opening is in direct ratio to the speed of the shutter. For example, it takes a certain amount of light to properly expose a particular film. Consequently, the smaller the opening in the diaphragm, the longer the shutter will have to remain open

to admit the given volume of light. The f. stop, shutter speed, and intensity of light might be compared to filling a gallon container with water from one pipe two inches in diameter and another one inch in diameter with an equal amount of pressure on each. For all practical purposes, the two-inch pipe would fill the gallon container in about one-fourth the time it would take the one-inch pipe to fill it, and as the water pressure on each pipe is increased, the length of time it would take to run a gallon of water will decrease. The same principle holds true in properly exposing a film. The larger the diaphragm opening — which would be relative to the size of the pipe — coupled with the intensity of the light — which could be compared to pressure — the less time it will take for sufficient light to properly expose the negative, or vice versa. Usually on better cameras the lens will range from about f/2 to f/32. The diaphragm opening decreases in size as the f. stop increases; that is, f/32 would be the smallest diaphragm opening and f/2 would be the largest. Technically, the f. values are an optical ratio of the focal length of the lens divided by its diameter. Actually, it regulates the amount of light entering the camera and also determines the latitude of images which will appear in focus.

The shutter speeds have one function, to allow light to enter the camera for a sufficient length of time to properly expose the film. Where action pictures are to be taken the shutter speed should be very fast; otherwise, the movement will cause the image to appear blurred. The larger numbered f. stop used will add more details in the foreground and background of the picture. For example, when photographing stationary scenes, a slow shutter speed should be used with a very high f. stop which will give increase in the depth of field; that is, more of the foreground and background of the picture will be in focus. By the same token, if lighting conditions are poor, a slow shutter speed with a large diaphragm opening (small f. stop) will still allow proper exposure of the film, but the details of the scene will not be as sharp and any movement might cause a slight blur on the print. In photographing a subject in which the background is undesirable or will detract from the subject, it is best to purposely open the diaphragm (i.e. f/2 - f/4.5) and use a very fast shutter speed in order to blur

RIGHT: This picture was shot at 1/200th of a second at about the same time of day as the picture on the right. Note how the vehicle appears to be stopped and all details are clear.

WRONG: This was shot at 1/50th of a second. The shutter speed was too slow to stop the action, and as a result, the car is blurred.

Caution should be exercised to eliminate shadows in pictures. These two shots show the most common mistake made by the amateur photographer — that is, permitting his own shadow to fall across the picture.

the background.

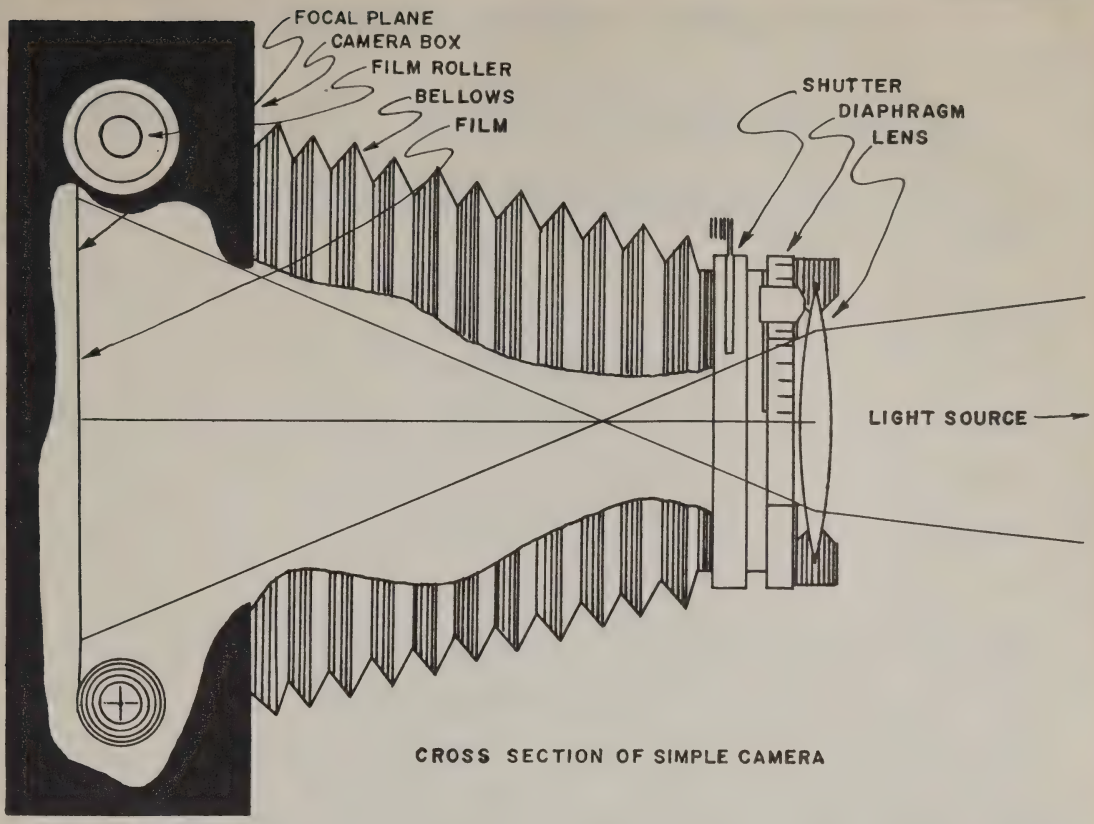
The third variable is the amount of light available where the picture is taken. This is the condition over which we generally have the least control and the least ability to accurately judge. For that reason, several devices are used to aid in determining the amount of light on the subject. Some scenes are stationary and will permit the photographer to select ideal lighting conditions, while other scenes are here today and gone tomorrow. Since it is impossible to choose an ideal time in the latter case, it is then necessary for the photographer to use good judgment, along with making the proper adjustments for the variable factors, if a good photograph is to be made under these adverse conditions.

The simplest aid in gauging the light is the table which comes with every roll or pack of film. Several conditions are illustrated and the suggested settings for the camera are recommended for each condition. This is satisfactory for the most elementary photography, but often the conditions in which a photograph must be made will not conform to this simple illustrative chart.

A somewhat more detailed, but simple and inexpensive exposure calculator is available which involves a much wider range of conditions, film speeds, and lens openings and gives simple illustrations applicable to practically any conditions. It is surprising what good results can be obtained by following the simple instructions on these calibrated charts.

For the advanced photographer, a light meter is recommended and is practically a must if color film is to be used. The light meter is an instrument used to determine and measure the intensity, or amount, of light. If properly used, the light meter takes the guesswork out of establishing the best settings for the camera. Once the fundamentals are mastered, the use of the light meter will greatly improve the quality of work.

The first step in using a meter is setting the exposure control dial according to the exposure index (speed rating) of the film being used. This number is included with the film by the manufacturer. If the wrong exposure index is used, the light meter will be of absolutely no value, but if set correctly and used properly, you can't go wrong. The most frequent mistake made in selecting the exposure index is using the tungsten rating (this is film made for artificial light) instead of daylight rating. The next step is taking the reading by pointing the light meter toward the subject to be photographed. In close-ups the meter should be held only a few inches (about four if possible) from the subject and in such a manner that no shadow will be cast on the subject. When it is not possible to get close to the subject, a correct reading may be obtained by holding the meter close to some other object having about the same color as the subject. In the case of a person to be photographed, the photographer can obtain a correct reading by holding the meter about four inches from his own hand as a substitute for the skin tones of the subject. In the case of photographing distant landscapes, the error most often made is that of holding the meter



CROSS SECTION OF SIMPLE CAMERA

at an incorrect angle. Usually the meter is pointed too high in distant scenes, and as a result, the reading will produce an underexposed picture. Special care should be taken to hold the meter on the same plane as the camera, but pointing it slightly downward. The exception to this rule is found where there is an extreme variation in brightness, such as a dark valley with a snow-covered mountain. In this case, a happy medium between the brightest and darkest objects in the scene should be used — that is, an average of the two readings. By setting the proper exposure index in the meter and pointing it in the correct manner, a combination of shutter speeds and f. stops are available, permitting the selection of these two combinations which would bring out the desired results in the picture.

Color photography is basically the same as black and white, with the exception of light. Color film requires several times as much light for proper exposure as other film. For best results, color should be shot between the hours of 9 a.m. and 4 p.m. in direct sunlight. In some cases, color is easier to shoot than black and white film. More details are visible and images appear sharper due to the different color tones, and the natural color adds beauty and interest to the subject. This tends to cover or offset any other imperfection in the picture. However, the handling of color film from the manufacturer to the finished product is tricky. Extreme caution must be employed in storing, loading, and developing. It is sensitive to both light and heat, and is expensive, so is recommended only for the advanced photographer.

There are exceptions to all rules and in photography it is often necessary for the operator to use sound judgment in compensating for various situations encountered. However, through the application of these basic fundamentals of photography, sharper and more interesting pictures should be your reward. Volumes could be written on this subject. People agree and disagree on everything from the size and make of photo equipment to the best techniques to employ. However, these rudiments of photography are basically sound and accepted and should prove helpful, whether you are using a simple box camera or an expensive press camera. After all, it is not so much the equipment, but the way it's used that counts.

ACCIDENTS REPORTED FOR JUNE

Equipment and Procurement Division

Total amount of damage and number of accidents is from September 1, 1953, up to date and is to both state-owned equipment and that owned by individuals involved in accidents.

District 1	11 Accidents	$2,262.50
District 2	5 Accidents	1,847.00
District 3	5 Accidents	2,310.00
District 4	9 Accidents	2,306.01
District 5	7 Accidents	895.90
District 6	2 Accidents	195.00
District 7	5 Accidents	492.00
District 8	8 Accidents	1,530.00
District 9	2 Accidents	535.00
District 10	5 Accidents	1,603.13
District 11	3 Accidents	500.00
District 12	21 Accidents	4,200.00
District 13	7 Accidents	2,111.93
District 14	10 Accidents	2,864.00
District 15	6 Accidents	995.00
District 16	4 Accidents	1,525.00
District 17	5 Accidents	301.25
District 18	19 Accidents	4,397.00
District 19	4 Accidents	754.50
District 20	6 Accidents	3,081.00
District 21	7 Accidents	1,850.00
District 22	2 Accidents	800.00
District 23	1 Accident	300.00
District 24	1 Accident	110.00
District 25	3 Accidents	166.00
Camp Hubbard	1 Accident	1,000.00

Repairs to Wolf Creek Bridge

S.H. 305, Lipscomb Co.

Charles W. Smith, Assistant District Engineer
District 4

In October, 1946, a contract was let for construction of a bridge 875 feet in length across Wolf Creek near Lipscomb, Texas. The structure consisted of thirty-five 25-foot slab spans, Design FS-8-24-25. Expansion joints one inch in thickness were provided for each span except Number 19, in accordance with the practice for this design bridge at that time. The bridge was completed in August, 1947.

Early in 1948, it became evident that most of the spans were taking additional deflection with maximum deflection at the mid-point of the span. A finished deck survey made in the summer of 1948 indicated that this additional deflection was fairly uniform for all spans, and was sufficient to give the bridge poor riding qualities. An inspection of the concrete caps showed that a considerable amount of spalling had taken place, as shown in the photographs. We attributed this spalling to two factors, high edge pressure on cap caused by excessive deflection of the slab, and the usual high rate of contraction and expansion in this area due to rapid temperature changes.

Since 1948 the spalling condition has become progressively worse, while the deflection appears to have stabilized. In October, 1953, a special maintenance project was approved for the repair of this structure. The minor plan sheets cover the method used in making these repairs.

It was considered desirable to fabricate the bearing plates in short sections, as shown, for ease in handling and in order to conform to the crown in the cap. The premolded expansion joint was cut away at the lower end in order to allow the three-fourths-inch rib to be placed against the concrete of the adjacent slab. All bearing plates were placed this past winter when slabs were contracted, and very little difficulty was encountered. R. C. Liles, Construction Foreman, was in charge of the work.

The level-up course of Type Q Asphaltic Concrete was necessary to compensate for the offset at the end of each slab caused by the bearing plate, and to improve the riding qualities mentioned as being caused by slab deflection. Level-up course has been placed and attached photographs show completed surface.

We are now making repairs to damaged caps. It was at first decided to use Gunite, or a similar method of applying a concrete patch to the cap. It has been decided, however, to experiment with the use of Embeco grout in making repairs. This work is now in progress, and photographs show the finished patch.

The bearing plates appear to be allowing free movement of the slabs, and no additional spalling has occurred since they were placed. We believe that this will prevent future cap trouble, although it is too soon to reach a definite conclusion. We wish to thank A. J. Sherrod of the Maintenance Division for his help in deciding on methods to be used in repairing this damaged structure.

INDEX OF SHEETS

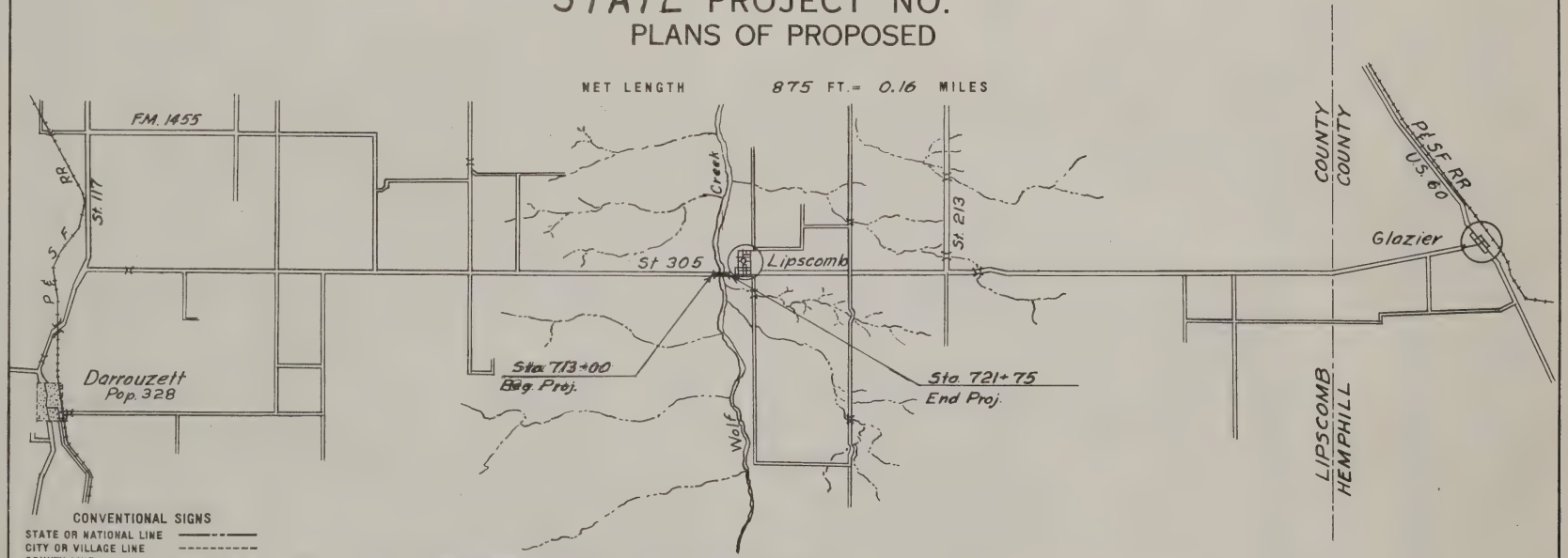
1 TITLE SHEET
2 TYPICAL SECTIONS
GENERAL NOTES AND SPECIFICATION DATA
STRUCTURE SUMMARY
QUANTITY SUMMARY

TEXAS HIGHWAY DEPARTMENT

FED. RD. DIV. NO.	STATE	STATE PROJECT NO.			SHEET NO.
6	TEXAS				
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
4	LIPSCOMB	582	1		St. 305

STATE HIGHWAY NO. 305
AT WOLF CREEK
STATE PROJECT NO.
PLANS OF PROPOSED

NET LENGTH 875 FT. = 0.16 MILES



CONVENTIONAL SIGNS

STATE OR NATIONAL LINE
CITY OR VILLAGE LINE
COUNTY LINE
BASE OR SURVEY LINE
RIGHT OF WAY LINE
RIGHT OF WAY MARKERS
FENCE LINE
RAILROAD
TRAVELLED WAY
CULVERT OR BRIDGE
POWER LINE
TELEGRAPH OR TELEPHONE

R.R. DELIVERY POINTS FOR MATERIALS

PLACE	R.R.	DISTANCE	CAR CAPACITY
Darrouzett	P & S F	16.5 Mi. to Sta. 717+37.5	20 Cars
Glazier	P & S F	15.9 " " " " "	25 Cars

SPECIFICATIONS ADOPTED BY THE STATE HIGHWAY DEPARTMENT OF TEXAS JAN. 2, 1951 AND APPROVED BY THE BUREAU OF PUBLIC ROADS JULY 25, 1951 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT.

SCALE: 0 2 Mi.

TEXAS HIGHWAY DEPARTMENT

CORRECT: _____
RESIDENT ENGINEER

RECOMMENDED FOR APPROVAL: _____
DISTRICT ENGINEER

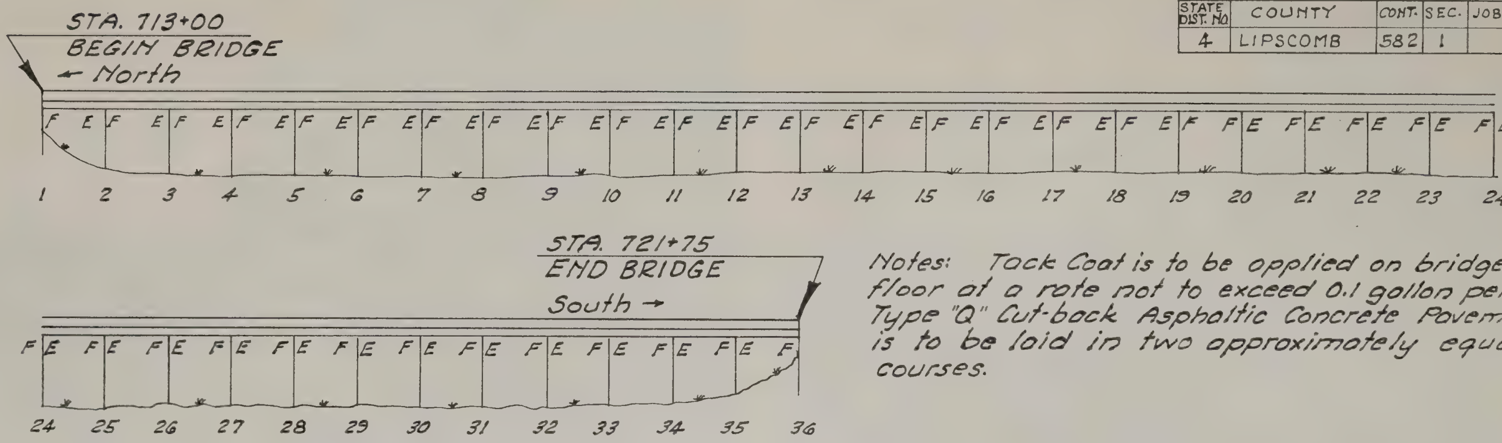
RECOMMENDED FOR APPROVAL: [redacted]
ENGINEER LAND SERVICE ROADS

APPROVED: [redacted]
CHIEF ENGINEER OF PLANNING

RECOMMENDED FOR APPROVAL: [redacted]
DISTRICT ENGINEER
BUREAU OF PUBLIC ROADS
DEPARTMENT OF COMMERCE

APPROVED: [redacted]
DIVISION ENGINEER
BUREAU OF PUBLIC ROADS
DEPARTMENT OF COMMERCE

FED. RD. DIST. NO.	STATE	STATE PROJECT NO.			SHEET NO.
6	TEXAS				
STATE DIST. NO.	COUNTY	CONT.	SEC.	JOB	HIGHWAY NO.
4	LIPSCOMB	582	1		305

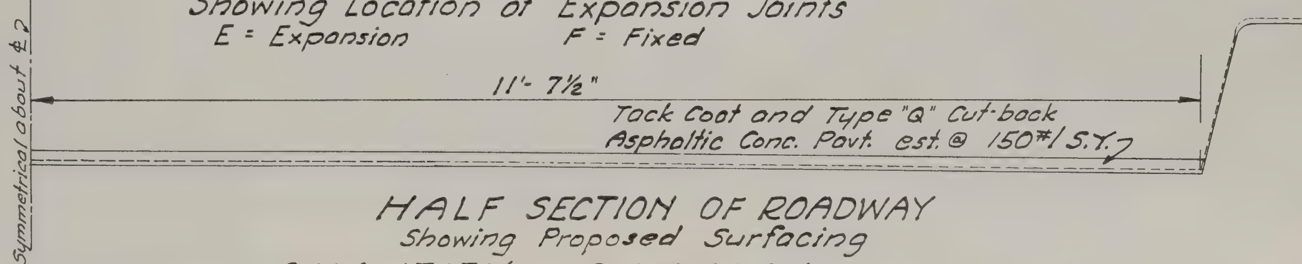


S K E T C H

Showing Location of Expansion Joints

E = Expansion F = Fixed

Notes: Tack Coat is to be applied on bridge floor at a rate not to exceed 0.1 gallon per S.Y. Type "Q" Cut-back Asphaltic Concrete Pavement is to be laid in two approximately equal courses.



HALF SECTION OF ROADWAY

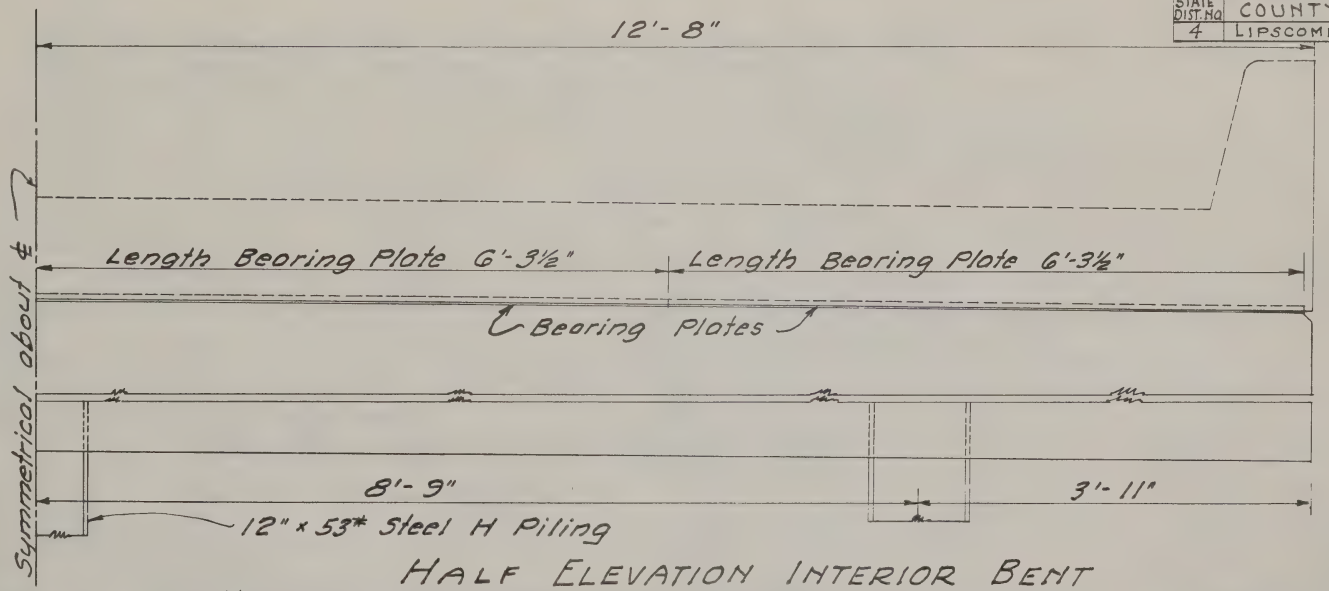
Showing Proposed Surfacing

QUANTITY SUMMARY

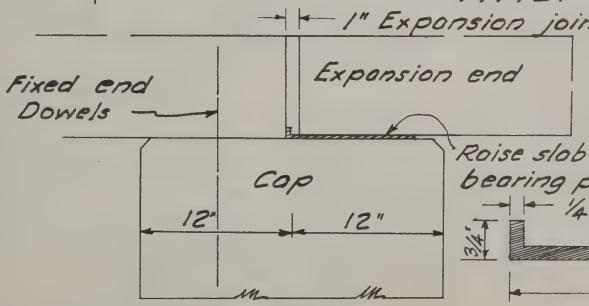
ITEM	DESCRIPTION	UNIT	QUANTITIES	
			Estimated	Final
Special	Placing Steel Bearing Plates	Ea. Bent	34	
Special	Repairing Damaged Caps	Lump Sum	1	
3118 Spl.	Type "Q" Cut-back Asph. Conc. Pavt.	Ton	175	

DETAILS & QUANTITIES

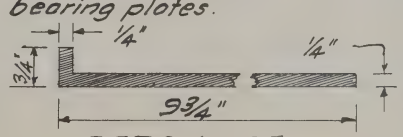
FED. RD DIST.	STATE	STATE PROJECT NO.				SHEET NO.
6	TEXAS					
STATE DIST. NO.	COUNTY	CONT.	SEC.	JOB		HIGHWAY NO.
4	LIPSCOMB	582	1			305



HALF ELEVATION INTERIOR BENT



PART ELEVATION INTERIOR BENT



DETAIL OF BEARING PLATE
Length 6'-3½"

Notes: The expansion end of all slabs shall be raised by jacking or other methods to a height necessary for placing bearing plates as shown hereon. The sections of plates shall be placed on a bed of "Embeco" grout or a grout of similiar characteristics. The top of the plates shall be thoroughly coated with 60 grade oil and heavily coated with powdered graphite before being placed on the bed of grout. After all plates in the bent have been placed in the position shown hereon, the end of the slab shall be lowered to full bearing on the plates. The method used in raising slabs shall be such as to cause no undue stress in the concrete.

DETAILS - PLACING BEARING PLATES

10-8-53.

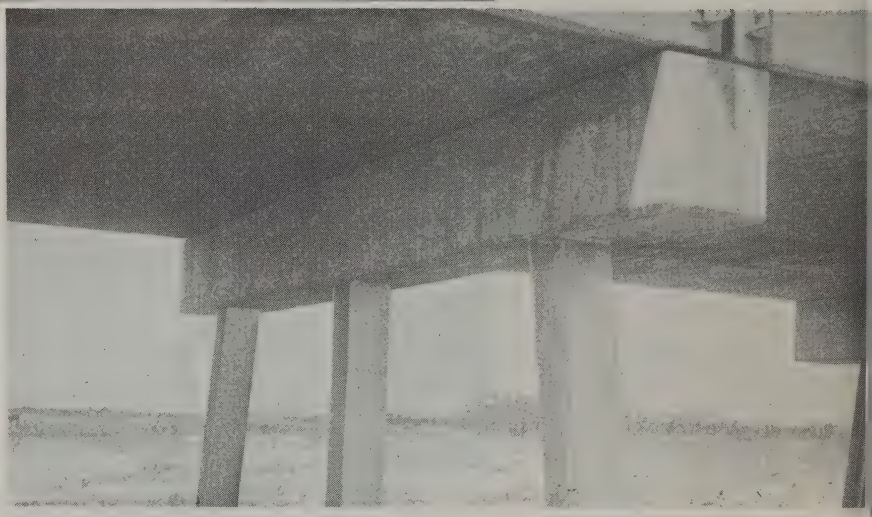
View of bridge after application of Type "Q" leveling course.

Another view after application of leveling course.

Spalled cap before patching.

Same cap after completion of patching.

Spalled cap before patching.



Same cap after patching.

. . . Five years ago, in behalf of the - - - Association, I wrote your office to ask that fireguards be maintained on the right of way, outside of our fences. I was referred to the district office.

The result of that request was that the district agreed to maintain a fireguard inside the fence (off of the highway) if we would bulldoze rocks, trees, etc. and make gates. The district has positively refused to permit a fireguard outside the fence on the right of way regardless of the width or terrain or the hazards to the property owner.

A fireguard inside the fence is a spotty, inefficient operation and affords little protection in dry times like this to the rank growth of powder dry vegetation produced on 45 feet of unused and ungrazed right of way. The wind and burning fence post will carry the fire over. Good fences cost $1,000 per mile. A fireguard inside furnishes no protection to it.

I fought fires five days straight last week. Thousands of acres burned. There will be more. As long as there is a rank growth of dead grass on the highway and thousands of people passing, there are going to be fires and if there is no fireguard bladed outside the fence, the adjoining property owner is in constant danger of being wiped out.

I do not believe the Highway Department wants to be a bad neighbor and create the ill will of the adjacent property owner, but that is exactly what is happening in this district. Why can't we have some protection from fire bugs and careless smokers? Other districts do. It makes any livestockman's temperature rise to drive down the highway (especially the wide ones) and see this unused portion producing a rank growth of jungles lapping high upon the fences just waiting to be ignited and put him or his neighbor out of business. Due to the rank spring growth and the powder dry conditions, and I speak of hundreds of ranchmen when I ask that you do something to afford us some protection immediately. We want fireguards outside the fence on the right of way where they belong.

(Signed)

. . . I hope that I am addressing the right person about the thing I have in mind. If not, I would thank you to help me contact the right party.

My beef, I'll call it that for want of a better term, is this. Why is it that we in - - - Texas or, I'll be more explicit, here in - - - County, can't have the highway right of way cut?

I have just gotten back from a trip through central Texas and on to the coast. Most of the highways were fairly clean and some west of Houston are just like a lawn.

I believe it was in Hamilton County near the town of Hamilton I saw not just one mowing rig, but four all in one-fourth mile. There has been very little cutting in our part, and as the right of way is 100 feet wide there are about 75 to 80 feet growing up in weeds and grass. I may be wrong about where the cutting should take place, as I usually am about most every thing, if so, in this instance please give me the reason why.

(Signed)

. . . I like the honest effort that the Highway Department makes to do its job. Seems to me you are really trying and have good roads . . .

Chicago, Illinois

. . . You need more three and four lane main highways . . .

Bakersfield, California

. . . Roadside tables should have signs approaching same advising travelers before they pass them . . .

Gallup, New Mexico

. . . A little while ago we drove to Taylor, Texas, where my brother lives. We used one of your roadside tables, and read:

"We Hope Our Previous Guest Cleaned
Up Before Leaving."

Being the kind of people who like to do what is right without persuasion from a ball bat, we put our used pop bottles in the container, wadded up the paper napkins, and shined the table top till we couldn't find a speck of dirt. Furthermore, the guy ahead of us must have had the same idea; we started clean and left the same way - - and in a mighty pleasant state of mind.

In fact, liked the idea so well we decided we better tell you.

S. C. Carroll
Omaha, Nebraska